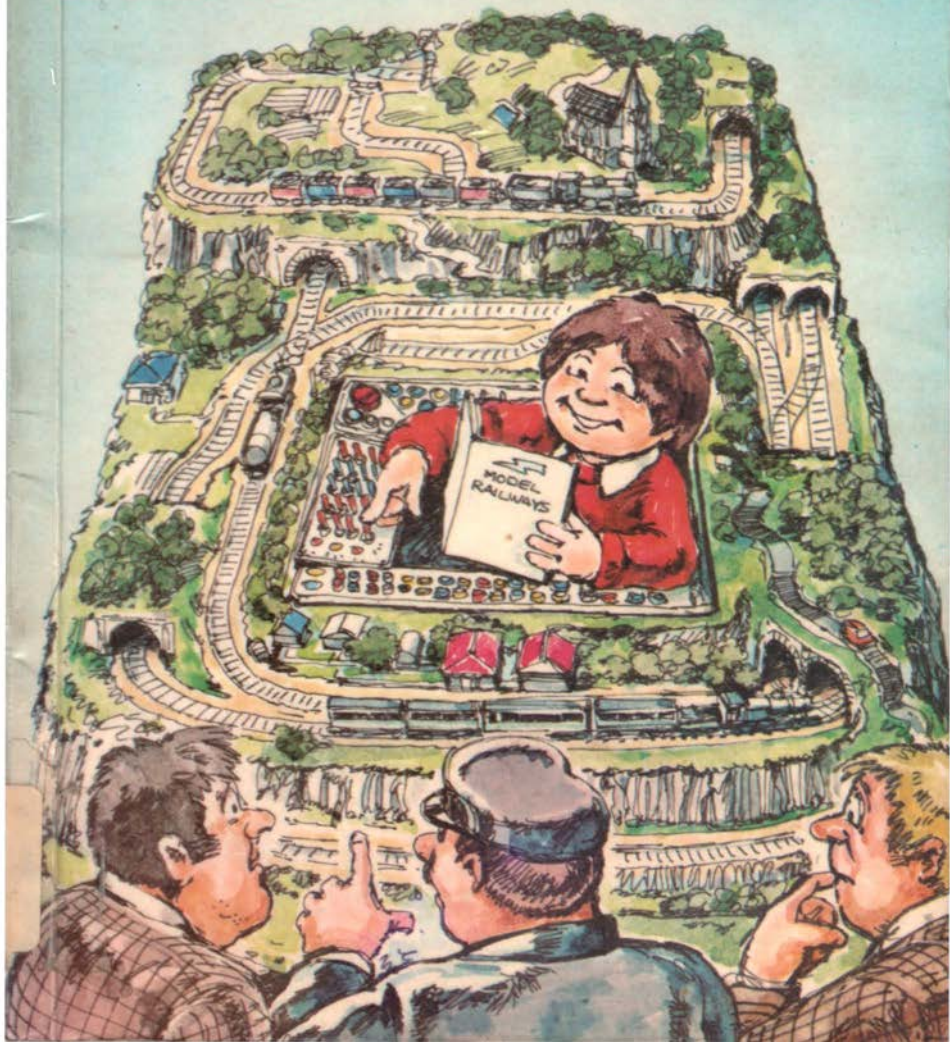
WHIZZ KIDS

MODEL RAILWAYS



MODEL RAILWAYS

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MACDONALD

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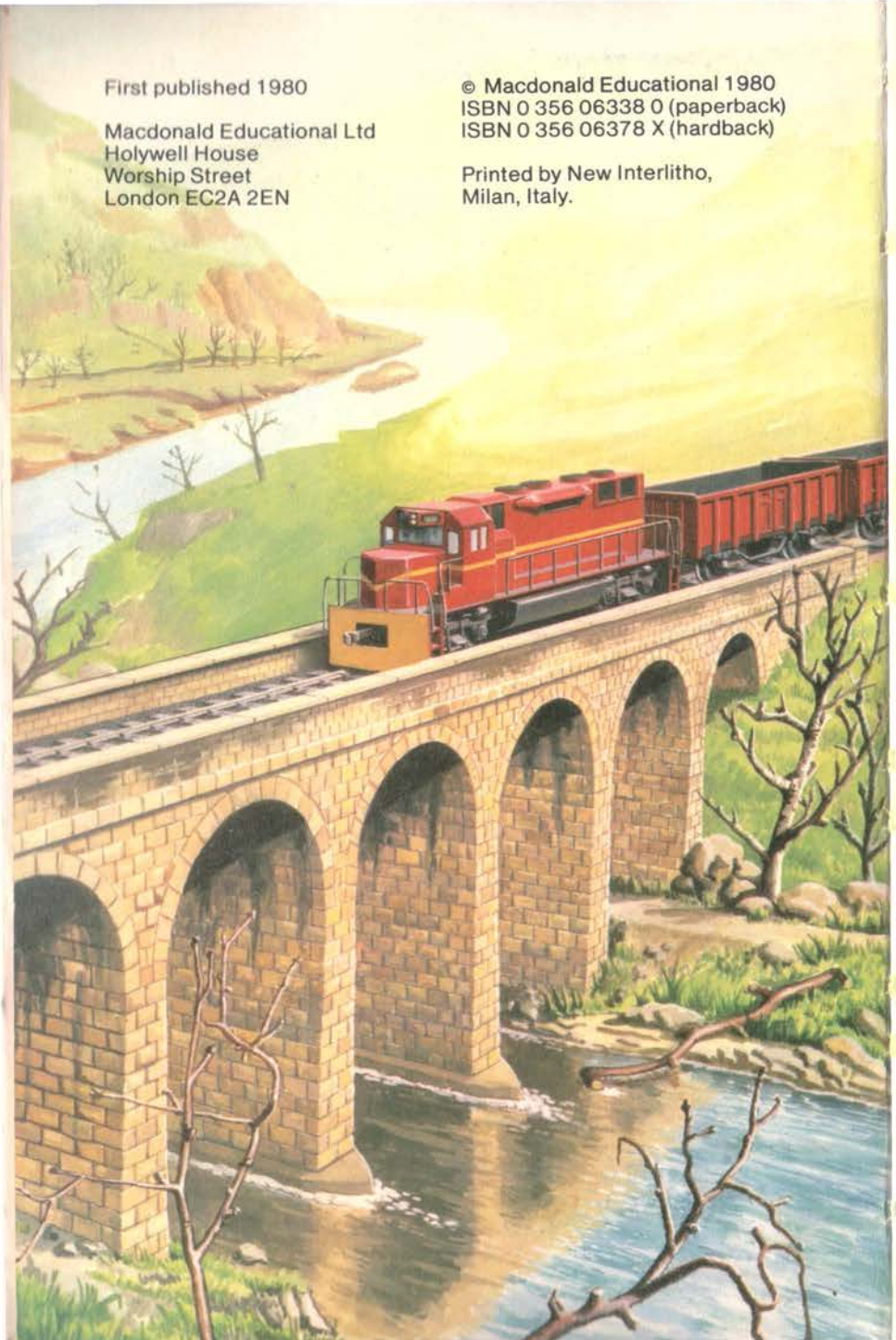

About this book

This book has been carefully planned to help you become an expert. Look for the special pages to find the information you need. **RECOGNITION** pages, with a **bright red flash** in the top right-hand corner, contain all the essential information to know and remember. **PROJECT** pages, with a **grey border**, suggest some interesting ideas for things to do and make. At the end of the book there is a useful **REFERENCE** section.

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Starting off

A 1930s tinplate model, powered by clockwork.

The first working models of locomotives were built nearly 200 years ago. Some of these early tinplate trains were simple pull-along toys. Others were powered by steam or clockwork. By 1900, people could buy electrically powered models but these were collectors' items and very expensive.

Model railways today

Until the 1930s the idea of placing model locomotives and coaches in realistic-looking scenery was almost unheard of. But the hobby has become more and more popular and today almost anyone can afford to create a model railway of their own.

Starting simply

Making your own layout need not be very expensive. Most people start with a simple ready-made set, which will probably include a locomotive, some carriages or wagons **(rolling stock)**, a few metres of track and a power unit. You can buy scenery and station buildings but it is much more fun to make your own — and much cheaper.

Choosing your layout

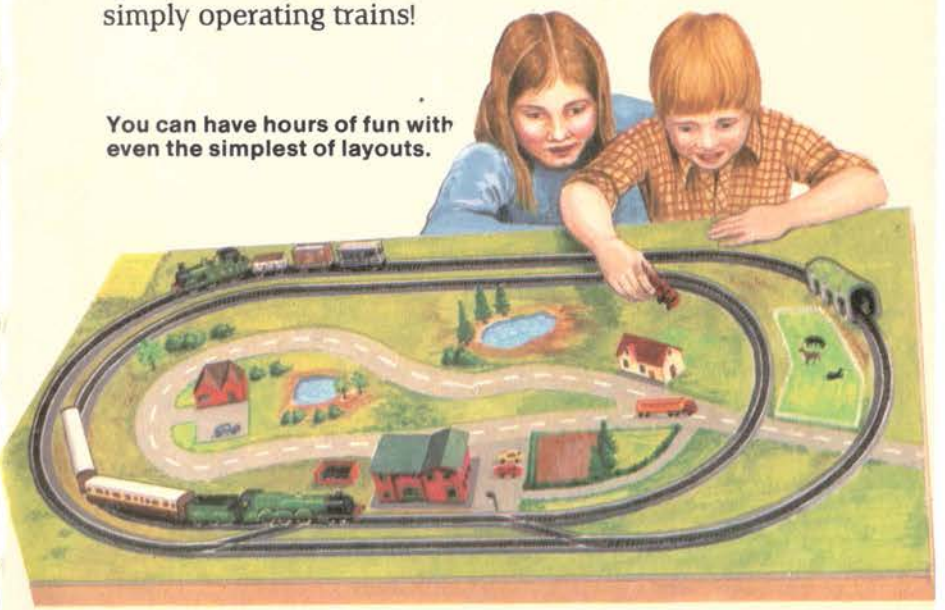
Some railway modellers make an imaginary landscape for their locos and rolling stock and this is probably the best way to start. As you become more experienced, you may want to build a layout that is a miniature version of part of a real-life railway or **prototype**. This can be a modern railway or a historical one based on one of the old steam companies.

Adding to your collection

You can then start to collect equipment that goes with your particular layout. Some people buy ready-made locos and rolling stock but many enthusiasts prefer to make their own. They either use kits, or plans and materials that they have collected themselves. This is called **'scratch' building** — because you have to start from scratch.

So you can see that there is a lot more to the hobby than simply operating trains!

You can have hours of fun with even the simplest of layouts.



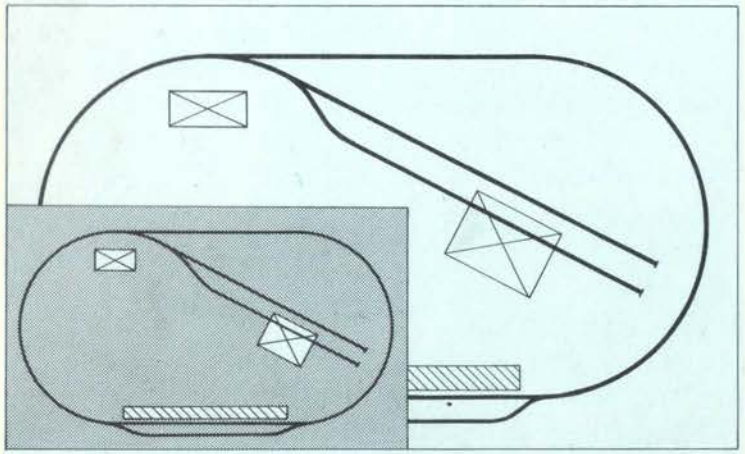
What is gauge?

For nearly a century, model railways have been divided into various gauges. Each of these gauges expresses the ratio in size between a model and its prototype. It is also the distance between the inner faces of the rails.

00/HO and N gauges

In this book we shall deal with just two of these gauges — the ones you are most likely to come across. These are **00/HO** and **N**. The first has a track gauge of **16.5mm** and the second of **9mm**.

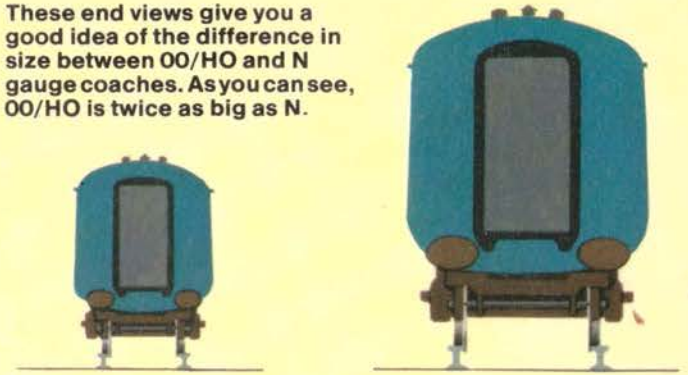
All you need to remember is that 00/HO models are twice as long as the N gauge version of the same prototype. This means that an N gauge layout will fit into a space roughly a quarter of the size of an 00/HO model.



▲ This diagram shows how identical layouts in 00/HO and N compare in size.

Build your railway in 00/HO gauge unless you are very short of space.

These end views give you a good idea of the difference in size between 00/HO and N gauge coaches. As you can see, 00/HO is twice as big as N.



Which gauge to choose

00/HO is by far the most popular gauge today. HO is mainly used for North American and European models and 00 for British prototypes. Although they both have the same track gauge, the 00 models are a fraction larger.

If you are short of space however, you may prefer to use the smaller N gauge. But it is worth remembering that there are fewer models available in the N gauge and that in general they are more expensive.

Another drawback is that whereas you can buy 00/HO models in any toy or hobby shop, N gauge models are usually only stocked by specialist model railway dealers.

Railway exhibitions

If you cannot make up your mind, go and visit a model railways exhibition. There you will see many of the gauges in action and you can ask advice from the people operating them. Above all don't worry if you already own some sort of train set. It is better to start with this than to begin all over again.

Where to put your railway

If you are lucky, there will either be a small spare room in your house or your bedroom will be large enough for you to build your railway there. Your layout can either be **permanent** or **portable**. But whatever type you choose, always build it on a proper baseboard. (See pages 12-13 to find out how to make one.)

Portable layouts

If you are short of space, you can slide a medium-sized baseboard under your bed. Screw castors to the bottom of the board and cover it with a piece of plastic or an old sheet to protect it from fluff.

Your baseboard can also be up-ended and stored behind a wardrobe. But if you choose this method of storage, do be careful not to knock the wall or your layout.

The fully portable layout, where the railway is broken down into four or six sections and then put away in a cupboard or stored in a special rack, is probably the best solution of all.

Slide a portable layout under the bed.

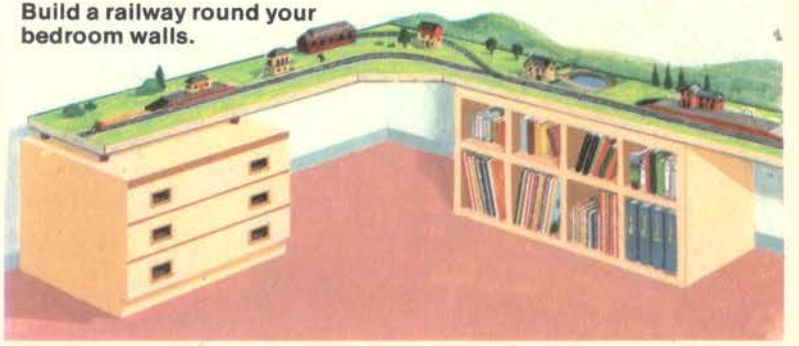
Make a hinged baseboard and hook it to the wall.

Permanent layouts

One solution is to hinge the baseboard and hook it to the wall so that it can be folded away after use (see above). But do make sure that this is done by a good carpenter.

Another possibility is to build your railway around the walls of your bedroom (see pages 54-55). This looks realistic and doesn't take up much room because for much of the run it only occupies air space above the furniture.

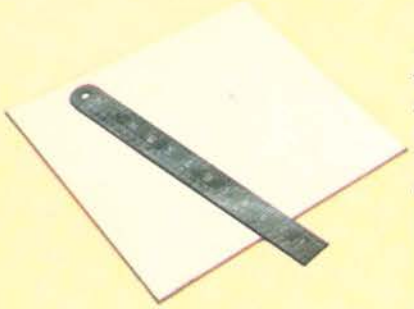
Build a railway round your bedroom walls.



The tools you will need

You will only need a simple tool kit to make your first layout. Most of the tools illustrated here can probably be borrowed rather than bought.

Keep everything safe in a box and use a large piece of coarse card as a work top. This will allow you to cut out materials without damaging the table underneath.



◄ **Use 1 mm thick white card** for modelling buildings and scenery and a **steel rule,** marked in millimetres, for measuring and cutting against.

► Measure angles correctly and set out accurate circles with **set squares** and a **pair of compasses.**

◄ A small, wire framed **hacksaw** with **pin-ended blades** is the best tool for cutting wood and metal.

► A geared **drill brace** and a set of **twist drills** will make small holes in almost any material.

◄ A **craft knife** with renewable blades is the best tool for cutting out card.

► You will need a **hammer** for laying track and building your baseboard. Use one with a lightweight head.

◄ **Pliers** are used to grip things, pull wire and twist it into shape. A fairly heavy set is best to start off with.

► **Tweezers** are cheaper and just as useful as small pliers when you need to hold tiny parts.

◄ You will also need two **screwdrivers** — a small one for metal screws and a larger one for woodscrews.

► **DAS modelling clay** is very useful. It stays workable when it is damp and doesn't crack when it hardens.

◄ **PVA (white) glue** is a very good all purpose glue which dries clear. You may also need **balsa** and **plastic cements.**

► Use an ordinary **pencil** for marking out. Permanent lines for stones, bricks etc. can be made with a **ball point pen.**

Baseboard building

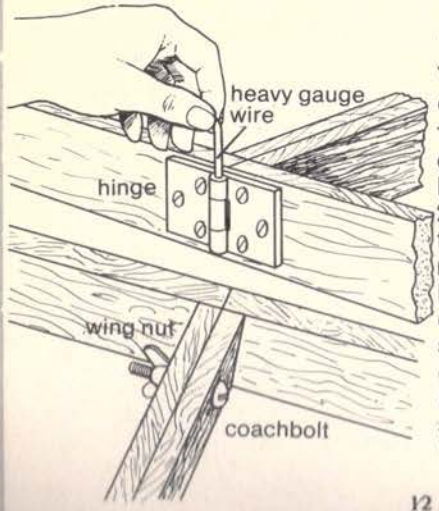
Although you can lay your tracks on a floor or table, you will find that they are always getting in the way of other people. So it is best to build your layout on a baseboard.

How to make one

A poor baseboard will spoil the running of your trains, so take time to make one that is really strong and rigid. The easiest way is to make a rectangular frame out of lengths of deal or pine board (see opposite).

Cover the frame with a surface of ply or chipboard which can be screwed or glued to the top. **Never** use hardboard. It is too hard to take pins and will bend under the weight of your equipment.

You can make a larger layout by joining several baseboards together. Support them on trestles or screw legs firmly to the corners. Make sure you choose a height that is convenient for both sitting down and standing.



Joining baseboards

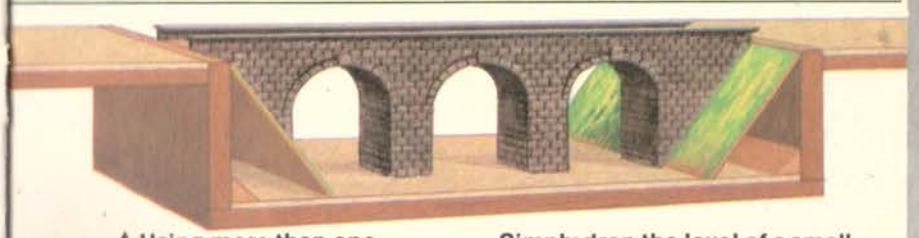
You can join baseboards in either of these two ways:

1. Coachbolts. These are excellent as long as you don't have to undo them too often.

2. Hinges. These are useful for portable layouts. Simply remove the pin from a hinge by filing off the head at one end. Replace it with a piece of strong wire or long nail bent over at the top. Then screw the hinge across the join. To separate the baseboards, just remove the nail.

Your baseboard frame should be made from **50mm x 25mm deal.** Cover it with **ply** or **chipboard, 12mm** thick. Make all joins with **40mm woodscrews.**

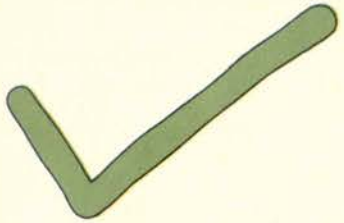
A unit larger than **1.5m x 0.75m** will be too heavy to move. So if you want to make a large layout, use several baseboards joined together.

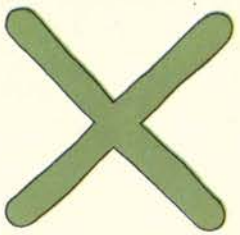


▲ Using more than one baseboard is a good way to introduce a bridge or viaduct into your layout.

Simply drop the level of a small joining section between two baseboards and build your viaduct on top.

Do's and dont's





Do plan your layout on paper before you start to build. Then you can be sure that everything is going to fit.

Do be careful when using sharp knives. Use a cutting board made from thick cardboard and always cut **away** from yourself — it's safer if the knife slips.

Do treat mains electricity with respect. Have all plugs fitted by a qualified electrician and if the mains lead is at all damaged have your power unit checked. Dropping your unit can also damage it — so handle it with care.

Do use good brushes when painting models. Work on old newspaper and apply several thin coats, leaving each one to dry overnight.

Do remember finally, that the best model railways took many years to develop and that most expert modellers began simply. It is best to start small and move on to more ambitious projects when you are experienced.

Don't try to cut through anything thicker than stiff paper in one cut. Several light cuts are much more effective.

Don't be careless with glues and adhesives. All of them are messy and some give off nasty fumes — so make sure you work in a well-ventilated place.

Don't rush your projects and **never** use blunt tools. Not only do they make more work, but by forcing them through your material you increase the risk of an accident.

Don't leave bits and pieces lying about after you've finished modelling. You will only annoy the rest of your family and vital parts may get lost.

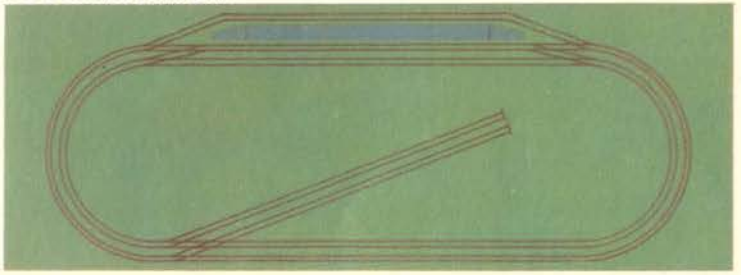
Don't ever, in your enthusiasm, trespass on the railway line. It is both illegal and **very dangerous**. Modern locomotives are faster and quieter than the old steam trains. So remember, it isn't clever to take chances — it is just stupid.

Your first layout

Your track parts will probably be limited at first, so start with something based on the schemes below. They are all sound basic layouts which will give you hours of fun. You can always move on to more complex ones later.

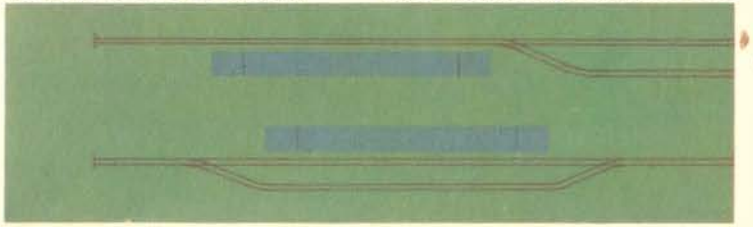
► The basic layout is the oval. It will allow you to watch your train without always having to keep an eye on the control units.

► To run two trains, link the two ovals with a **crossover** (see page 23). Two crossovers are not necessary because you can't run one train on to the other track until you've taken the second one off.



▲ Adding **loops** and **sidings** is useful as both allow trains to be run off the main line and either reversed or stored.

▼ **Terminals** (the places where the line ends) are good for storing extra trains as well as for shunting carriages etc.



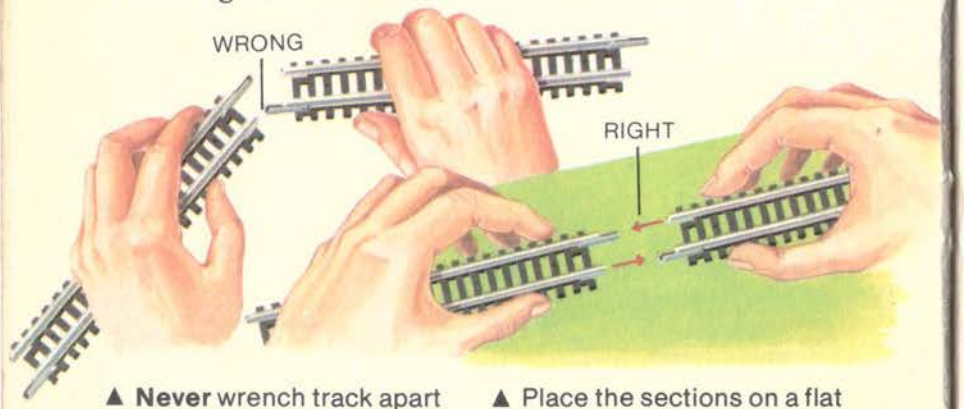
Track laying

You can buy two types of ready-made track: **sectional** (or rigid) and **flexible**. Sectional track comes in short lengths of straights and curves and is the sort sold with most train sets. Flexible track can be bent into any design you want and is therefore more like the full-sized prototype. It is however, much more difficult to lay correctly so it is probably better to use sectional track for your first layout.

Joining track

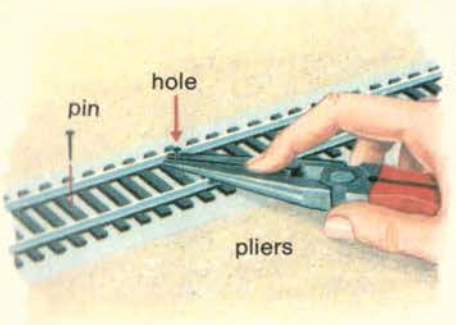
00/HO and N gauge track is joined with small metal clips called **rail-joiners** or **fishplates**. These are very easily damaged so push them together very carefully and **never** wrench them apart. Clumsy handling will open up the joiner and this will prevent proper electrical contact from being made.

You can close up distorted joiners with small pliers, but it is better to replace them with new ones. The pictures below show the right way and the wrong way to join tracks together.



▲ **Never** wrench track apart like this or join sections when they are at an angle.

▲ Place the sections on a flat surface and push together or pull apart in a straight line.



◄ Pin sectional track to the baseboard. Hold the pins with a pair of thin-nosed pliers or tweezers.

Never hammer the pins right home. It will make them difficult to remove and you could easily damage the rails. Bent or damaged rails will cause derailments and it is almost impossible to repair them, so do take care.

Laying track

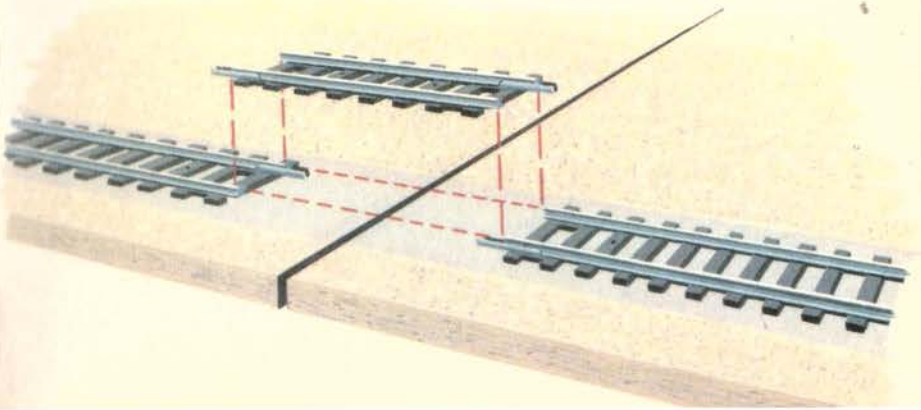
Once your track has been made to fit and you are sure that it is completely smooth, it is ready to be fixed down properly.

Some modellers stick their track onto a foam or cork underlay but it is just as easy to pin it into place. Use a pair of long-nosed pliers to push small **track pins** through the holes in the sleepers. This will hold track firmly without distorting it.

Baseboard joins

The easiest way to carry tracks across a baseboard join is to leave the sections that run across it without fixings. This means that when you separate the baseboards the tracks will come loose and can be carefully put away.

Do not fix down tracks if they cross a baseboard join.



Choosing a controller

A controller is a sealed box with a **mains lead** on one end, two or more **output terminals** at the back and some form of **operating knob** on the front. To operate your trains, you plug the mains lead into a socket, connect two wires to your track and twist the knob. Turning it in one direction will make the train move forward, turning it in the other will move it backwards.

Which type to choose

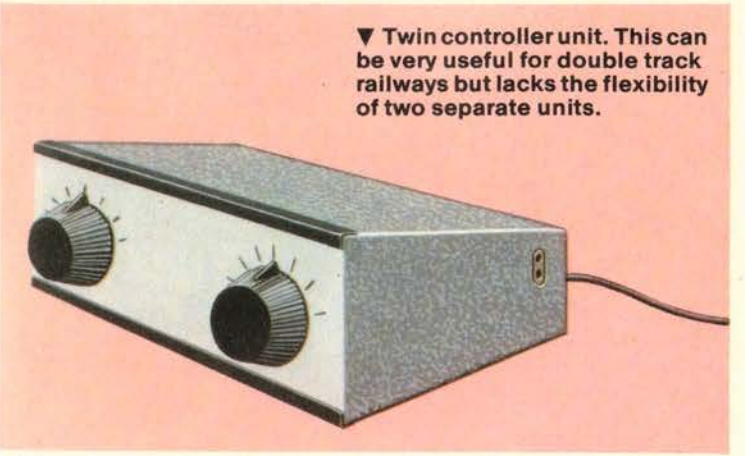
Most modern train sets contain a mains controller. You can buy a simple battery unit, but in the long term these are more expensive to run.

Control units take the mains current which is normally **240 volts AC**, and transform and output it at **12 volts DC**. On most types there is also a **16 volts AC** output for powering point motors, signal lights and other accessories. Make sure you choose one like this, as sooner or later you will want to use a controller with an auxiliary supply.

Some units have two controllers built in. These are useful for double track layouts but as you cannot separate them they can only be used comfortably by one person.

◀ This type of simple hand-held controller is supplied with the better train sets and is an excellent model to start with.

When buying a controller, always check the top of the unit for 'output'. Choose one that has an extra 16V AC output which you can use for powering accessories like point motors.



▼ Twin controller unit. This can be very useful for double track railways but lacks the flexibility of two separate units.

Electronic controllers

Generally these are expensive and are intended for experienced modellers only. If you want to try electronic controllers however, there are several low-price panel controllers on the market which work off a 16V AC auxiliary supply.

Safety

Although connected to the mains, modern control units are absolutely safe. However, if the mains wire is frayed or cut, or the casing battered or broken, they can be dangerous. Always have the plug fitted and any extension to the mains lead made by a **qualified electrician.**

◀ Electronic panel controller. These are usually light in weight and are ideal for building into control panels.

The transformer, which is the heavy part of the unit, can then be moved away from the control panel and positioned more conveniently near the mains socket.

Wiring techniques

Basic model railway wiring is easy. You just connect a power clip to the controller with two wires, push the clips into the track and switch on.

Isolating sections

If you want to run more than one train however, it is a good idea to use **isolating sections** (lengths of track which can be made electrically dead). These will prevent all your locomotives from moving together when the current is switched on.

Electrical isolation can also be achieved by using **points** or **turnouts**. If a point is set for a siding, the current will flow that way. But if it is set for the main line, then the siding will be isolated and no current will flow through it.

Using isolation

You can buy isolating sections at any model railway shop. Each length of track has a break in one rail called an **insulated gap** and two terminals which you connect to an **on-off switch.**

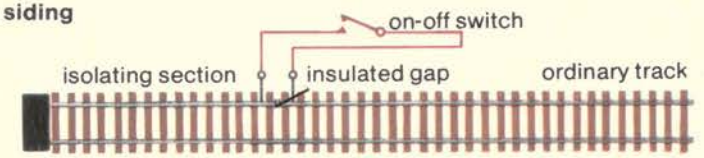
The diagram below shows you how to use an isolating section as a siding.

How it works

You simply place your isolating section at one end of the siding with at least one piece of ordinary track beyond it.

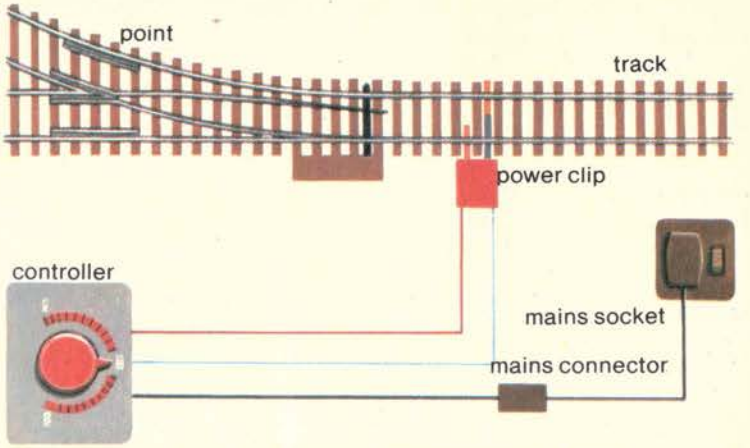
When you switch it off, the isolated track becomes electrically dead and any locomotive in the siding will remain stationary.

A siding



▲ A siding with an isolated section connected to an on-off switch will allow one loco to stand still while another is operated over the same section of tracks.

▼ This diagram illustrates the basic wiring for a model railway layout. The various units can be placed anywhere you want them, but the arrangement of the wires must be as shown.



Running two trains

If two trains are on the same track, they have to run in the same direction at the same speed, otherwise they will collide.

As you have seen, you can run more than one train on a simple track provided you add sidings in which the extra trains can be isolated.

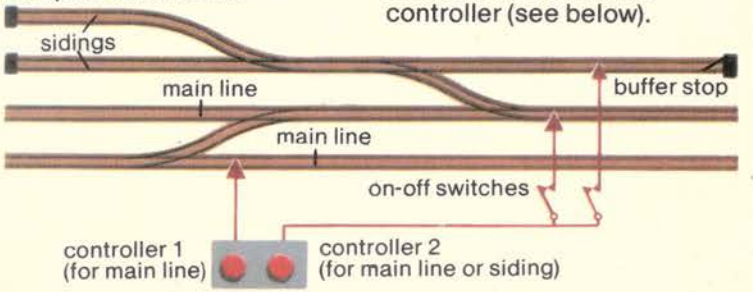
But the easiest way to operate two locomotives at once is to use two independent tracks.

Using double track

Of course if you use two separate tracks you will also need to use two controllers.

The tracks can be linked with **crossover points** (see pages 22-3) but both controllers must be set to run in the same direction to allow your locomotives to cross from one track to the other.

Store any other trains on sidings. These should be linked to the main line with crossovers and energized by an extra feed from one controller (see below).



How to connect sidings to a double-track layout

Points

Points are an essential part of any model railway as they are needed to make junctions and sidings. Without them your locomotive could only go round in circles. Basically, they are pieces of trackwork with a movable rail which directs a train from one line to another.

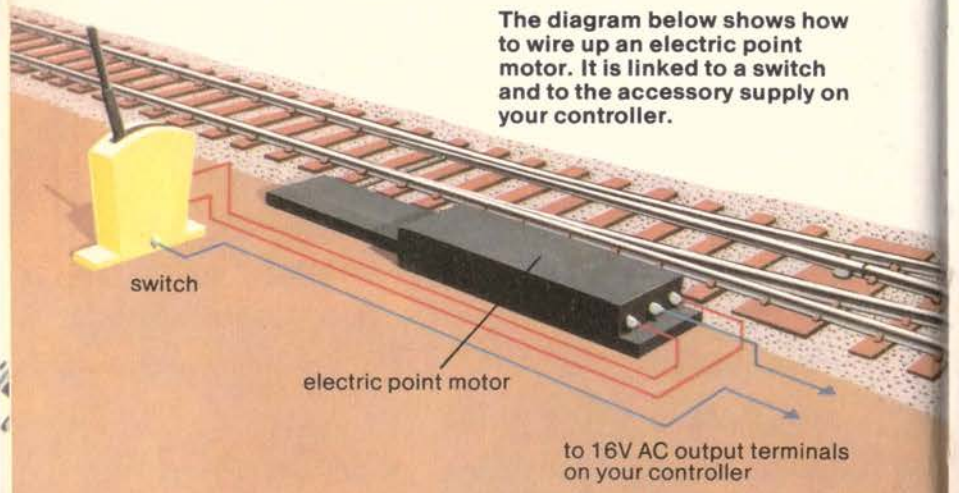
Looking after your points

Points are expensive, so treat them with care. Always follow the manufacturer's instructions exactly and never force or strain the mechanism. If it sticks it is more than likely that there is something stuck in the works. Remove it with tweezers.

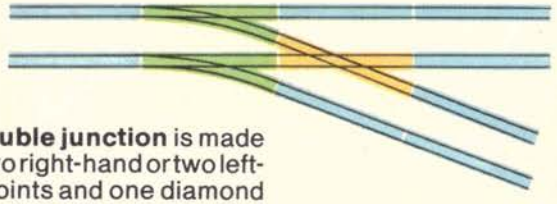
Lay points on an **absolutely flat surface** and never put baseboard joins through them. Don't pin them down — use the tracks on either side to hold them in place.

The diagrams opposite show some of the arrangements which are useful in model layouts. They can be operated manually or with **electric point motors** (see below).

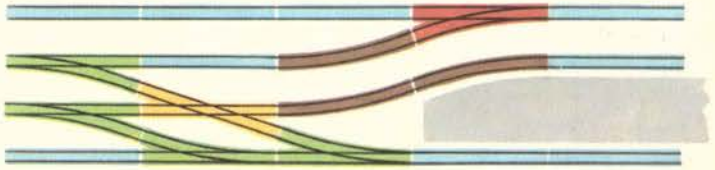
The diagram below shows how to wire up an electric point motor. It is linked to a switch and to the accessory supply on your controller.



▲ A **crossover** consists of two points laid back to back. Use it to join double track and to connect sidings to main lines.



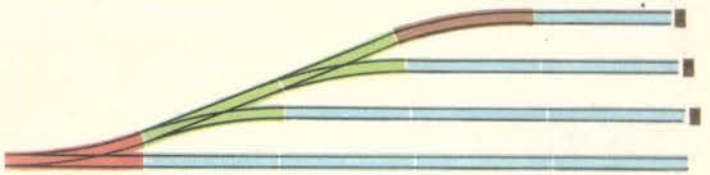
▲ A **double junction** is made up of two right-hand or two left-hand points and one diamond crossing. Use it to link two main lines.



▲ This is a **double to single track** formation. You will need four points and one diamond crossing.

▲ This arrangement shows you how to make a **loop.** It is very useful as it enables one train to pass another.

▼ **A ladder of sidings** like this one is the most convenient way to make a goods yard or set of storage sidings.



Colour code
Yellow = crossings
Red = left-hand point
Green = right-hand point
Blue = straight track
Brown = curved track

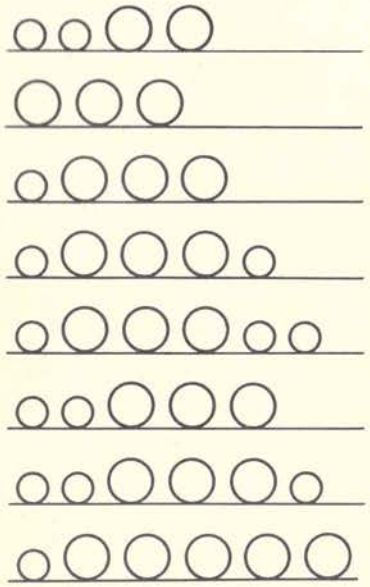
Steam locomotives

Steam locomotives can be bought ready to run or can be built up from kits. A small tank locomotive is probably the best type to start with.

Whyte notation

These locomotives are described by a system called the Whyte notation (see below). This breaks down the number of a locomotive's wheels into three groups: **leading, driving** and **trailing**. The small circles represent pairs of leading and trailing wheels and the large circles stand for pairs of driving wheels.

Leading and trailing wheels are small and are not powered. Driving wheels are coupled together and are linked to the cylinders.



◄ **4-4-0.** This set of wheels was used on the older passenger locomotives.
◄ **0-6-0.** The old freight engine or 'maid of all work'.
◄ **2-6-0.** This was used for the medium sized mixed traffic engine.
◄ **2-6-2.** Used for the branch and suburban tank engine.
◄ **2-6-4.** These wheels were used for large suburban tank engines.
◄ **4-6-0.** Used for general purpose and express passenger trains.
◄ **4-6-2.** These were found on the Pacific express passenger locomotive.
◄ **2-10-0.** Used for the final type of heavy freight engine.

► A Swedish State Railways Class S1 **2-6-4** T. This was a powerful tank engine, used for local passenger trains.

▲ An American Central Pacific Railways **4-4-0** 'Jupiter'. It was once the standard American locomotive.

▲ The L.M.S. rebuilt Royal Scott Class **4-6-0.** A typical British express passenger locomotive.

▼ The German Class 051 **2-10-0.** It was built for service during World War II.

Diesel and electric locos

Diesel and electric locomotives are generally cheaper than steam locos. They can be used for both passenger and freight work, so are ideal for a small layout.

◄ This **British High Speed Train** started a new era in rail travel. The Inter City 125 service was introduced on the Western Region of British Rail in May 1977. It travels at a speed of 200 kph — which makes it the fastest diesel traction train in the world.

▼ The **Milwaukee Road Class SD 40-2 'hood' diesel** is a typical modern American locomotive.

▲ The famous Swiss **'Crocodile' Class Be 6/8.** This is a heavy electric goods locomotive.

► The British **'Brush 4' Class 47 diesel.** This is a heavy freight and passenger loco.

▼ The French **Class 68 diesel.** It is typical of modern S.N.C.F. designs for multi-purpose locomotives.

Vans and coaches

You can buy coaches in both old and new designs and they can be anything from vans to restaurant cars. There are so many different types that you may find it difficult to choose between them. If you are limited for space, start by collecting basic passenger stock plus one or two vans, rather than the more exotic vehicles.

Try to improvise

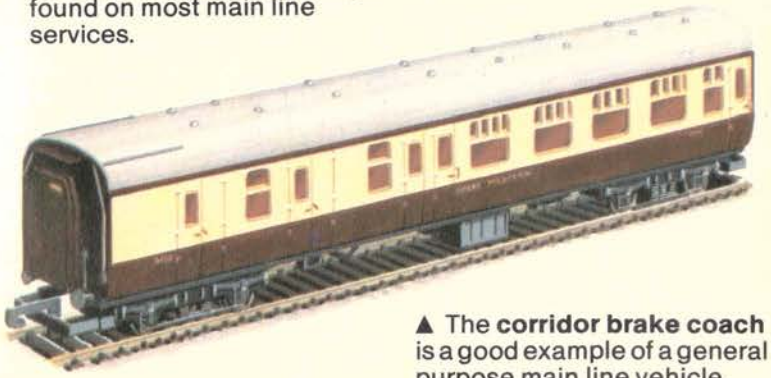
Vans can be run together to form parcel or newspaper trains and a working mail coach can easily be accompanied by passenger stock or vans. In the same way, although sleeping cars usually form complete trains, it is not unknown to have one or two added to an ordinary overnight service.

Once again, coaches can be bought either ready-made or in kit form. These kits contain plastic or white metal pieces that you glue together and then paint.

▼ The **diesel railcar** is now the standard unit for all secondary services. This version is used on the German Federal Railways.

▲ This American Great Northern Railway **dome car** was called the 'Empire Builder'. It was a luxurious observation coach, used for scenic routes.

▲ This French National Railways **restaurant car** is a typical example of modern catering coaches — a vehicle found on most main line services.



▲ The **corridor brake coach** is a good example of a general purpose main line vehicle. This one is painted in the colours of the Great Western Railway.

Wagons

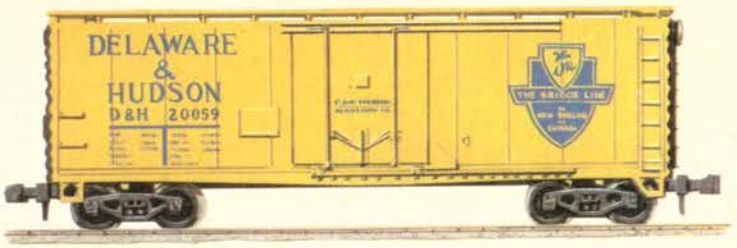
There are two basic types of goods trains. The most common is the **general purpose train** which has a variety of wagons bound for different destinations. The **block train**, on the other hand, consists of only one kind of wagon and is used to make shuttle runs between two fixed points — like a coal mine and a power station. Block trains are normally only used by more experienced modellers who already have a good general purpose collection.

Choose a wagon to suit your layout

Most rail-borne freight is carried in the basic open wagon and box van. So you can easily run a realistic service with nothing more than these. Special purpose wagons are more fun but should be chosen with care. For example, you would hardly expect to find wagon loads of steel girders and sheet iron on a sleepy cross-country line. Cattle trucks and milk tankers would be much more in keeping!

▼ British freight trains were for many years not fitted with continuous brakes. So there used to be a special **brake van** for the guard at the rear of the train.

▼ These colourful **open wagons** ran on British railways until World War II. They were privately owned so that different firms could use them as they wished.

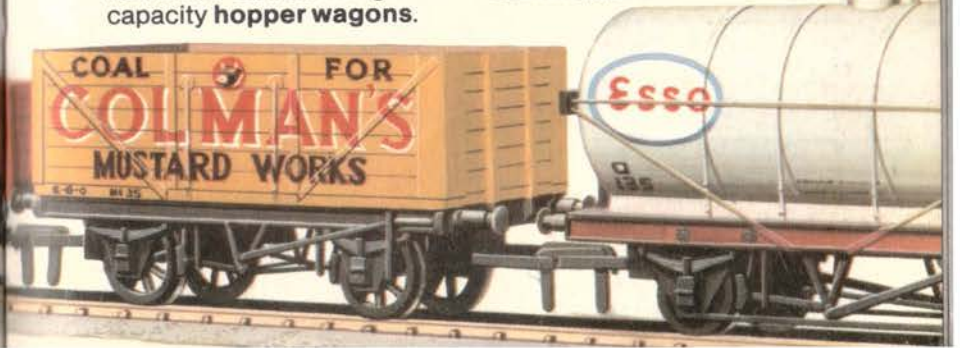


▲ The **box car** is the main American freight vehicle. This one is used by the Delaware and Hudson Railroad.

▲ This is a Belgian Railway modern large-capacity **open wagon.** It is normally used for minerals like coal.

▲ Modern mineral traffic is now often carried in high-capacity **hopper wagons.**

▼ Oil and petrol are carried in **tank wagons.**



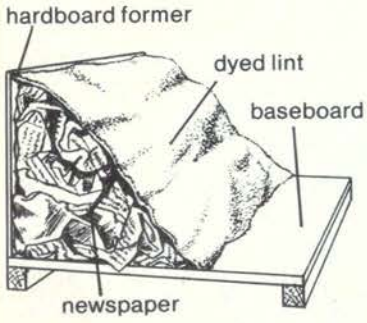
Landscape ideas

There are nearly as many ways of creating a landscape as there are railway modellers! One of the simplest is to take some ordinary medical lint and dye or paint it green. It doesn't need to be a very dark, even colour as real grass varies in shade. When the lint is dry, stretch it over a base of crumpled newspaper and glue it into place.

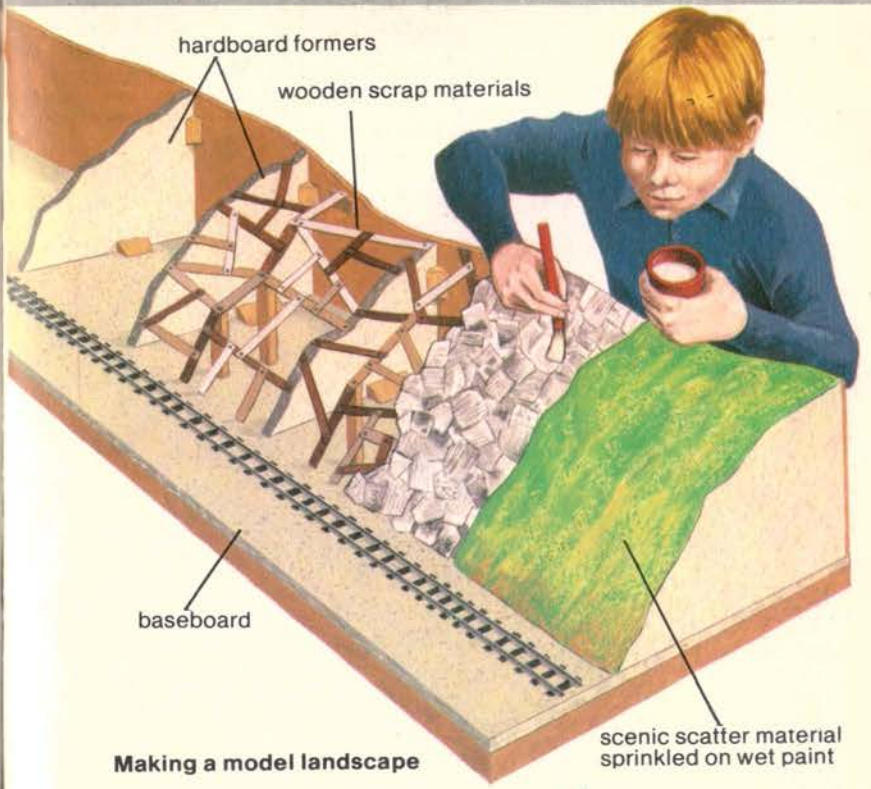
Making a frame

Another good method is to construct, from scrap materials, the light wooden framework shown opposite. Then mix up a small amount of wallpaper paste in an old cup or small jar. Tear a newspaper into pieces about 3cm square and paste them over the frame. Leave it to dry overnight, apply a second layer, allow this to dry too and then apply a third coat. It will form a strong, hard shell that you can cover with a sticky green paint and then sprinkle with scenic scatter material. Finally, cover it with a sheet of paper and press down firmly.

Rock faces can be modelled from pieces of cork bark which you can buy in your local florist. Use water-based paints to add the finishing touches.



◄ On the left is a cross-section of a simple landscape. It is made from dyed lint stretched over a crumpled newspaper foundation and fixed to a piece of stiff board at the edge of the baseboard. Ideally this **former** should be made from hardboard but strong card can also be used.



Making a model landscape

▲ Make a more elaborate landscape by pasting newspaper over a framework of wooden scrap materials and hardboard formers. Allow at least 24 hours for each coat to dry. Create a grassy effect by covering wet paint with scenic scatter material. This is just dyed sawdust which you can buy quite cheaply from any modelling shop.

► Use twigs to make your model trees. For a wintry landscape leave them bare. If you are modelling a summer scene add pieces of lichen which can be bought from a modelling shop or florist.

Two types of model tree

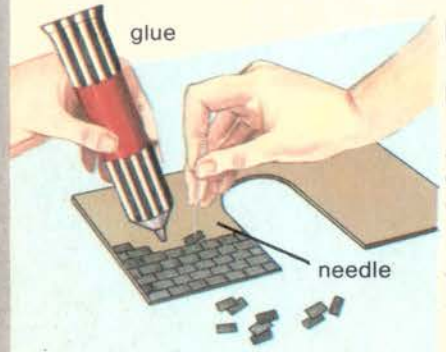
Bridges and viaducts

Railway bridges usually fall into one of three categories: **masonry, concrete** or **girder**. You can buy ready-made bridges which can be fitted over or under your tracks and landscaped in. But it is more fun to make your own.

How to make a masonry bridge

Make the frame from balsa wood or thick card. You will need a road surface across the top and at least two, preferably four, uprights. Assemble them as in the picture opposite, then add a thin card arch between two of the uprights. Glue on side pieces made from stiff card or hardboard.

Cover the frame with brickpaper or apply individual stones (see below). Don't forget to include the brick arch or your model will look wrong. Many sheets of brickpaper include printed arches you can use. Finally, add coping stones — a strip of card with the stones marked in ink and then painted to match the bricks.



Bricks and stones

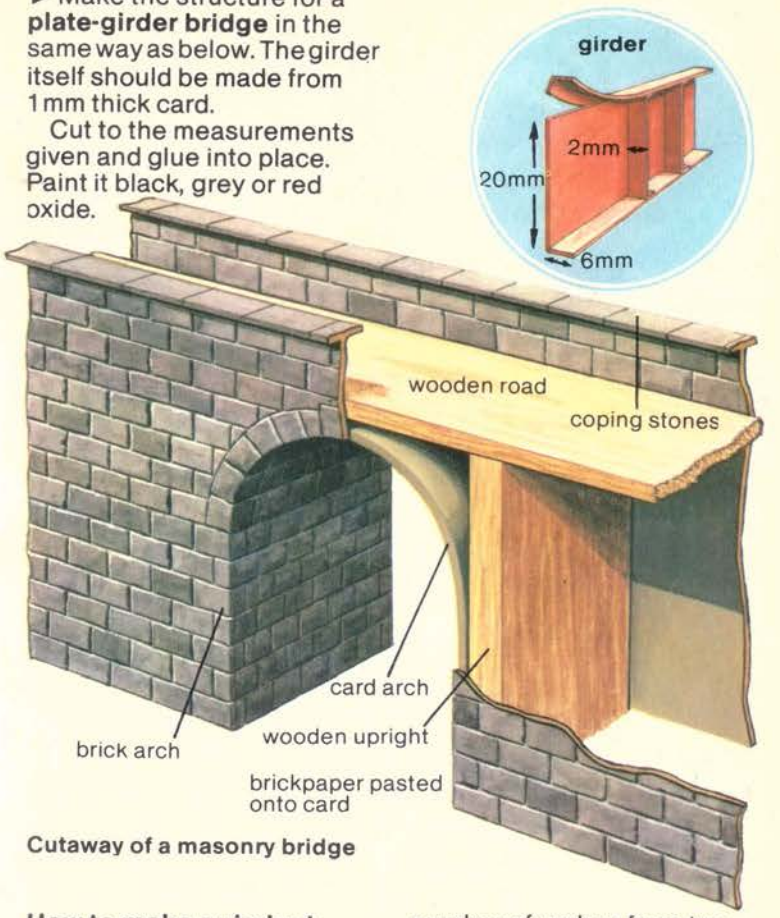
Make realistic-looking bricks or stones by cutting out small pieces of thin card or collecting the punchings from computer cards.

Use a needle to pick them up, then glue them into place. When they are dry, paint them the colours of your choice.

This method is rather fiddly but it's a good way to spend a couple of wet days during the holidays — and the results are worth it!

► Make the structure for a **plate-girder bridge** in the same way as below. The girder itself should be made from 1 mm thick card.

Cut to the measurements given and glue into place. Paint it black, grey or red oxide.



Cutaway of a masonry bridge

How to make a viaduct

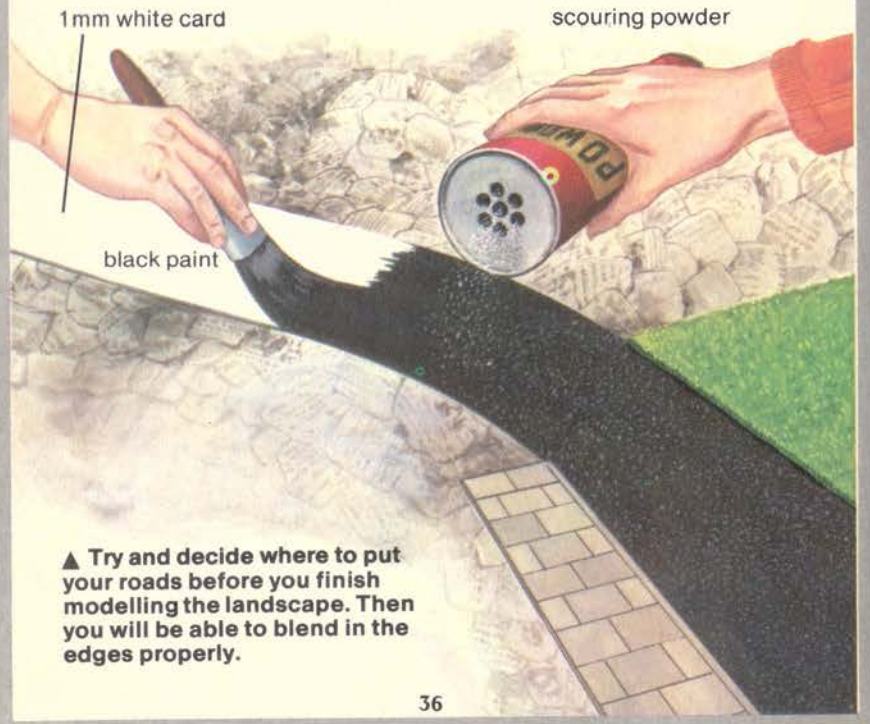
If you have made the masonry bridge above, you will not find this difficult. After all, a viaduct is only a series of arch bridges placed next to each other. Simply cut out an equal number of arches from two long sheets of card and glue them to a balsa structure like the one above. Most viaducts have equal sized arches, but where a river has to be crossed the arch should be wider.

Roads

The best way to make a road is to cut out long strips of card and fit them into your landscape. To make the card look like tarmac, first paint it dark grey or black, then sprinkle household scouring powder over the wet surface and allow to dry. Now add the edging.

Pavements can be cut from card, marked out in ink and then painted. In the country, allow the lint to overlap irregularly or model concrete edging stones from strips of balsa.

It's better not to paint white lines and other road markings as this is very difficult to do properly. One important modelling rule is that if you can't do it well, leave it out altogether.



▲ **Try and decide where to put your roads before you finish modelling the landscape. Then you will be able to blend in the edges properly.**

Tunnels

A tunnel mouth is very similar to the masonry overbridge on pages 34-5. The main difference is that the arch is **oval** at the top instead of round.

Make the portals and tunnel entrance from 1 mm thick card. Cover it with brickpaper and then add the capping strip at the top. Line the tunnel as far as the eye can see with more brickpaper or a piece of black card. This will make it look longer than it really is. Finally, build your landscape over the top of the tunnel and make a **cutting** in front of the tunnel mouth.

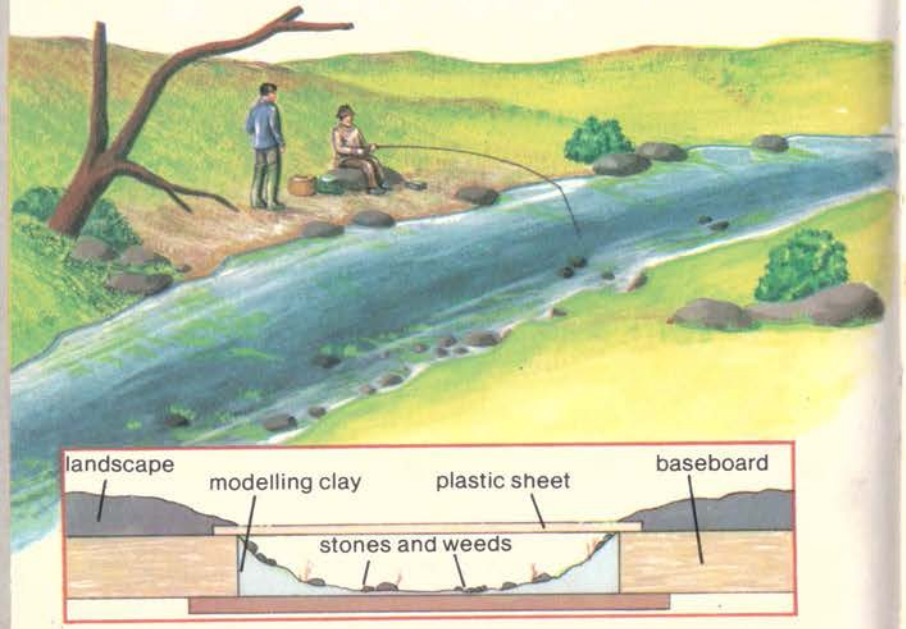
Some tunnel mouths were very elaborate — if you feel adventurous why not try making a mock castle out of card or wood?

Modelling water

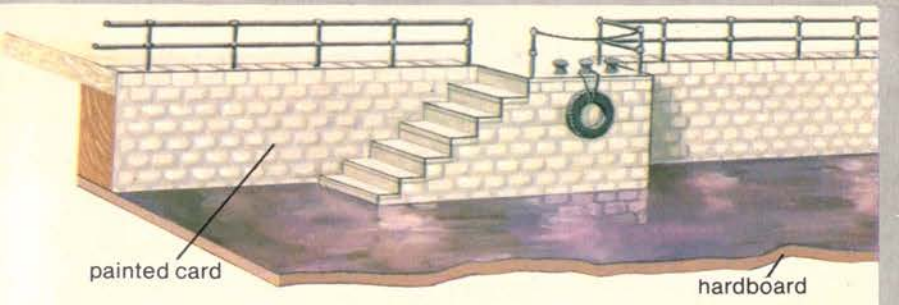
How to make a river or stream

Cut a section out of your baseboard (see below) and screw a piece of hardboard underneath the hole you have made. Now form the river bed with modelling clay. When it is dry, paint it to look like water then add weeds and small stones. Finally, cover it with a sheet of clear plastic and stick dyed sawdust weeds around the edges.

Cover the edge of the plastic with landscape, making sure that the line of the bank follows that of the river bed. Then, to really bring the scene to life, paint ripples on the plastic with clear varnish and place some model fishermen on the banks.



Cross-section of a river



▲ Canals and docks

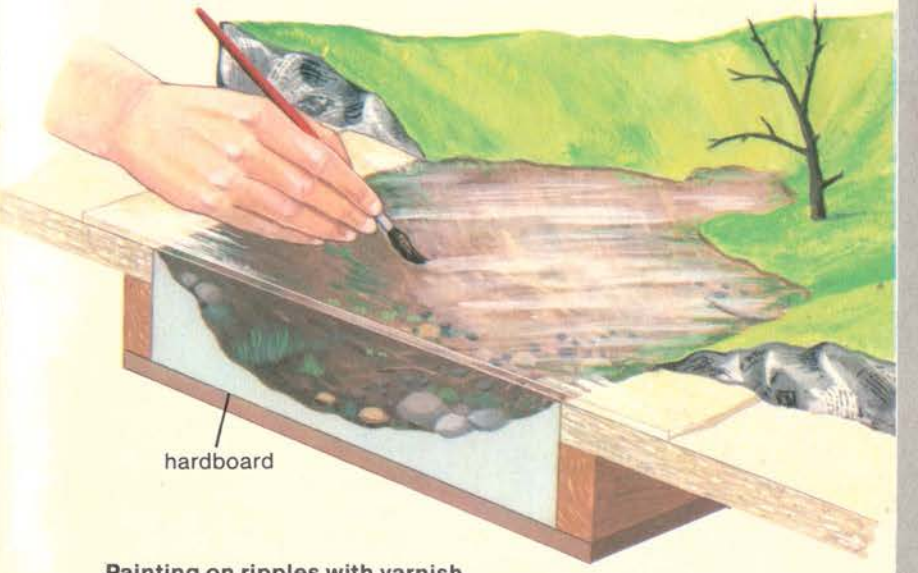
This is the easiest water to model because it is still and rarely transparent. Simply stick a piece of hardboard under the baseboard, paint it brown and purple and then coat it with varnish.

Docks often have small flights of steps down to the water level so that rowing boats can be landed. Make these and the stone walls out of painted card.

▼ Lakes

These are made in exactly the same way as rivers and streams. There is a difference in their shape but they don't need to be any deeper.

If you want to link a stream to a lake, it is a good idea to use two pieces of plastic and hide the join under a bridge. Lakes can be decorated with small plastic boats, and trees and buildings can be added to the banks.

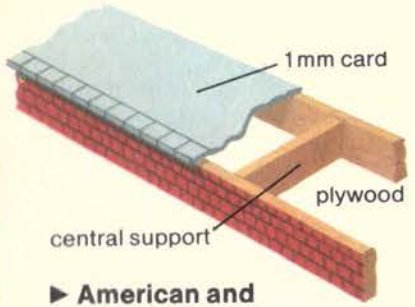


Painting on ripples with varnish

Platforms and people

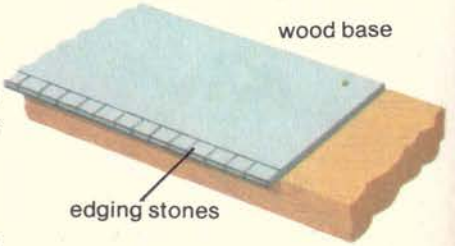
Now that you have built your model landscape, you will want to add some lineside buildings. Start by making your platforms.

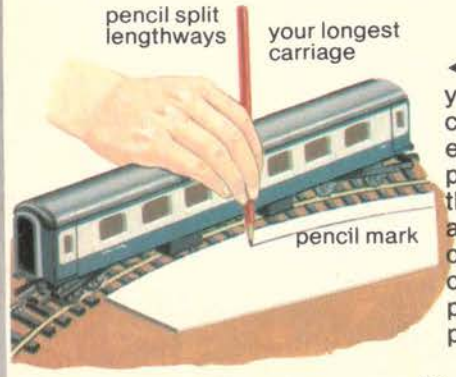
In Europe and North America, these are usually just above rail height. British platforms are higher and have a sloping ramp at each end. Both types can be made quite simply with thick card and pieces of wood.



◄ British platforms. Make a framework out of ply or chipboard like the one on the left. For 00 gauge it should be **15mm** high. Cover the top with 1 mm thick card. The ramps at each end can be made separately and then glued into place. They should slope gently and be about **70mm** long.

► American and Continental platforms. These can be made from pieces of solid wood or from several thicknesses of card, glued together. Paint the top surface to look like tarmac or paving stones and draw in a stone edging with a pen.





◄ If your platform is curved, you must make sure that your coaches do not strike the edge of it. Measure it by placing a piece of card against the track, holding a pencil against the centre of your coach and running it round the curve. Position the edge of the platform **2mm** away from the pencil mark.

Adding people

Platforms really need people to bring them to life. You can buy painted models but these are expensive. Unpainted sets are cheaper and are easier to alter. Simply scrape away any unwanted details and add new ones with modelling clay. Many 25mm model soldiers can be changed into workmen or passengers in this way.

Study the people at your local station, then arrange your figures in realistic groups.

1. Use modelling clay to change a cheap model soldier into a workman. The unpainted sort, **25mm** high, are the best ones to use.

2. Cut away the helmet, belt and gun with a craft knife or scapel. Then remodel the head and arm and add a spade.

3. Allow your figure to dry, then paint it carefully. Use a mapping pen to dot in the eyes and mouth. Apply a second coat if necessary.

4. For extra realism, cut away the plastic stand and force a pin up one leg. Make a small hole in the platform and push the pin into it.

The station building

Many station buildings were simple, single storey structures which are quite easy to model. So it is best to start with one of these.

The station building opposite consists of two sides, two ends (which are identical), a base and two roof sections. Follow the instructions below to find out how to make it.

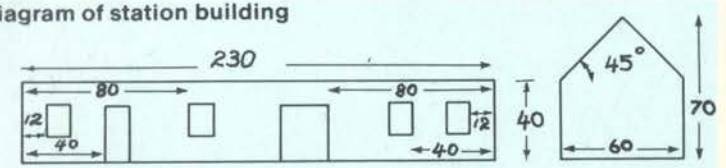
Materials
You will need plenty of **1mm thick card.** Make sure it is good quality. Mark out the sides and ends to the measurements given below. Note how the positions for the windows and doors are measured from the **ends** rather than from each other.

All the measurements are in millimetres and are for the **00/HO gauge**. For N gauge halve the sizes except for the base, which should be **113 x 30mm.**

Assembly
Cut out the sides and ends with a sharp **craft knife** and **metal rule,** and glue them together to form a box. The sides should overlap the ends — this is why the base is 2mm shorter.

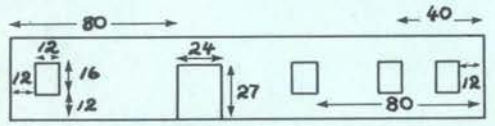
For greater strength, glue four pieces of **5mm square stripwood, 40mm long,** to each of the corners. Then leave it to dry overnight so that the glue completely hardens. Use either **white glue** or **acetate cement.**

Diagram of station building



Platform side

End section



Road side

Make the base 228 x 60mm. The roof sections should be 235 x 45mm. All the windows are the same size (12 x 16mm).

The doors are all 27mm high but vary in width. Single doors be 12mm wide, doubles are 24mm.

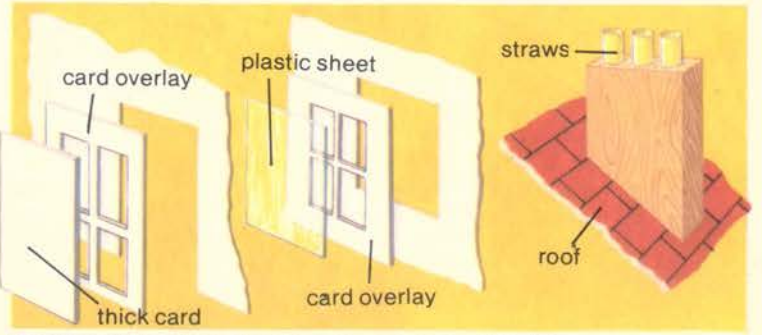
The finished model

Adding bricks
Use brickpaper to cover the sides and paint or mark out any stonework. If you use brickpaper, take care to get the courses — the lines of brick — **horizontal.** Nothing looks worse than a sloping line of bricks! Add lintels and sills cut from **postcard.**

Doors and windows
Use thin overlays cut from card to make your doors and windows. The pictures below show the shapes. Back the door with a piece of **thick card.** Back the windows with **clear plastic.** Then fix them into place with sticky tape.

Fixing on the roof
Now glue the roof sections into place. To hide the join along the top, cut a strip of **stiff paper 8mm wide** and fold it exactly down the middle along a **metal rule.** Glue it along the top to represent the ridge tile. If you are very patient you can tile the whole roof with strips of stiff paper overlapping each other.

The chimney
Cut a **45°** slope off a piece of **stripwood, 12mm wide** and **8mm thick,** and glue it to one side of the roof. Chimney pots can be made out of small lengths of **drinking straws.**



Doors, windows and chimneys are made like this.

Make your own signals

Although signals aren't essential, they certainly add to the fun of running a model railway.

They can be expensive if you buy them ready-made, but you can build your own colour-light signals for little more than the cost of two grain-of-wheat bulbs.

Materials
You can buy **grain-of-wheat bulbs** in good model shops. You will also need some **1 mm white card,** a **plastic drinking straw** and a length of **signal ladder.**

Make them by following the instructions opposite. Then paint them black.

Connecting the wires
Bare the ends of each of the four wires. Then twist **one** wire from each lamp together. Connect this to one terminal of the **16V AC supply** on your controller. The other AC terminal should be connected to the **common terminal** of a 2-way switch (see below).

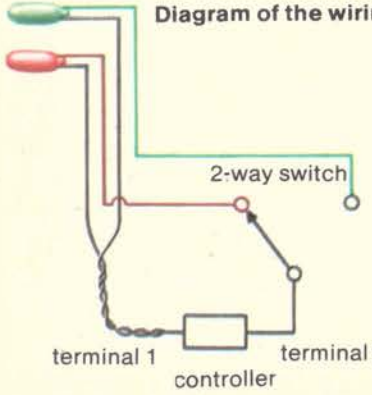
Extend the remaining wires from each lamp by twisting them to longer wires. Cover the joins with sticky tape. Then connect them to the **output terminals** of a 2-way switch.

How to make a 2-way switch
All you will need is a piece of **plywood,** three brass **round-headed screws** and a strip of **metal** with a hole at one end.

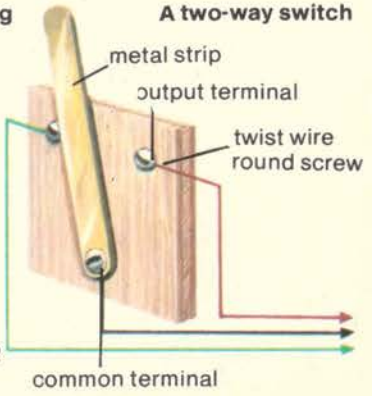
Take care to smooth any sharp edges on your metal strip with sandpaper. Then assemble the switch as illustrated below.

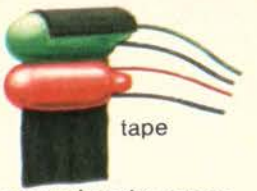
Operate the lights by pushing the metal lever to the left or the right until you touch the screws.

Diagram of the wiring

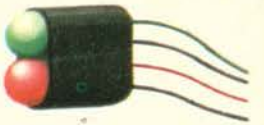


A two-way switch

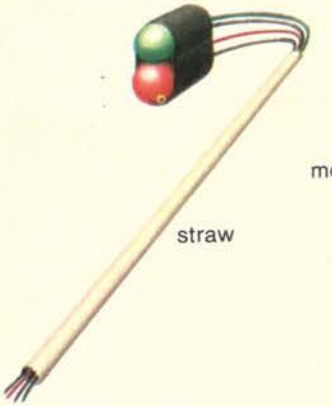




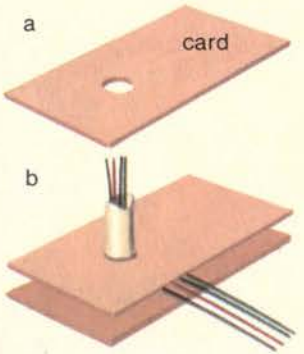
1. Take a red and a green **grain-of-wheat lamp** and a strip of **sticky tape.**



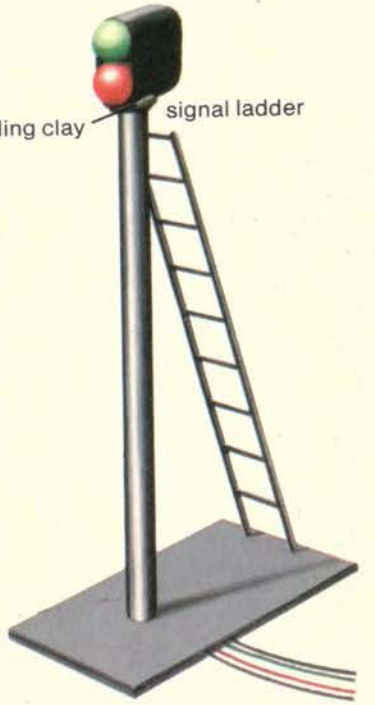
2. Gently wrap the tape around the lamps, as shown. This will form the head of the signal.



3. Now thread the wires down a piece of **plastic drinking straw** about **40mm** long.



4. Cut a piece of card **15mm** x **30mm** and make a hole at one end large enough to take the straw **(a).** Glue it into the hole.



5. Arrange the wires as shown **(b).** Then stick another piece of card underneath. Secure the head to the stem with **modelling clay** and add a piece of signal ladder.

Connect the wires, as shown opposite, to a 2-way switch and your controller.

A goods shed and signal box

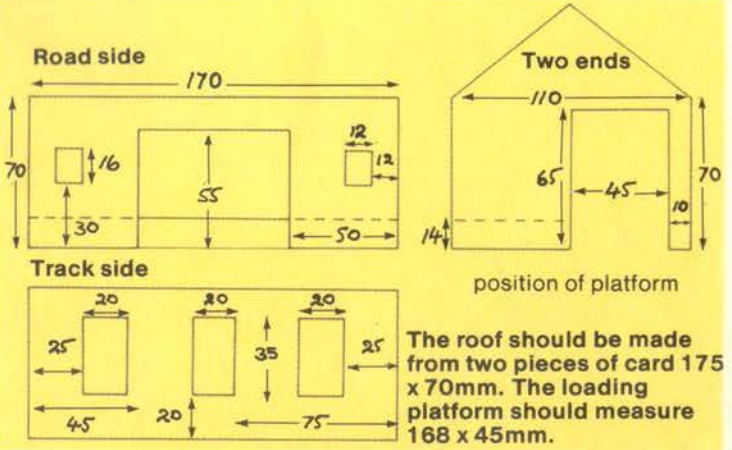
How to make a goods shed
The construction of the goods shed is very similar to that of the station building described on pages **42-43**. There is of course one important difference: your track has to run through the middle, so there is no base.

The **loading platform** which runs along the rear wall gives the building some stability, but the front wall is without support.

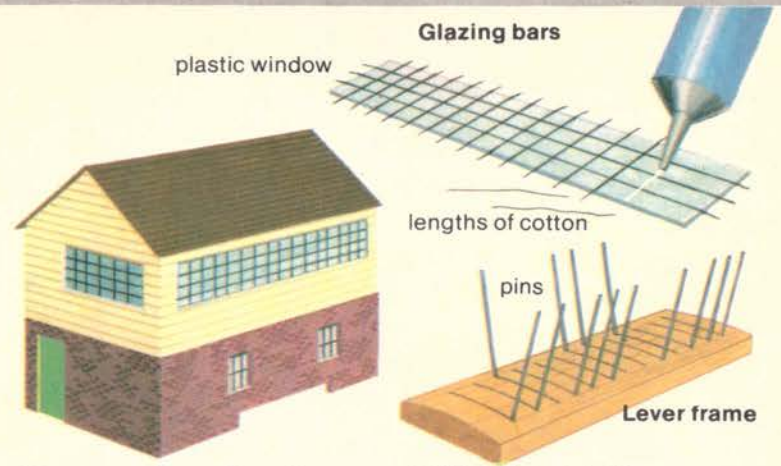
A choice of materials
Plywood is a good idea if you have a fretsaw and know how to use it properly. But if you decide to use plywood you will have to adjust your measurements slightly to compensate for the extra thickness of the material.

For most purposes however — and especially if you are modelling in the N gauge — you can use **1 mm thick card.**

Diagram of goods shed



The roof should be made from two pieces of card 175 x 70mm. The loading platform should measure 168 x 45mm.



How to make a signal box
The signal box is a little more complicated to make because each side is different.

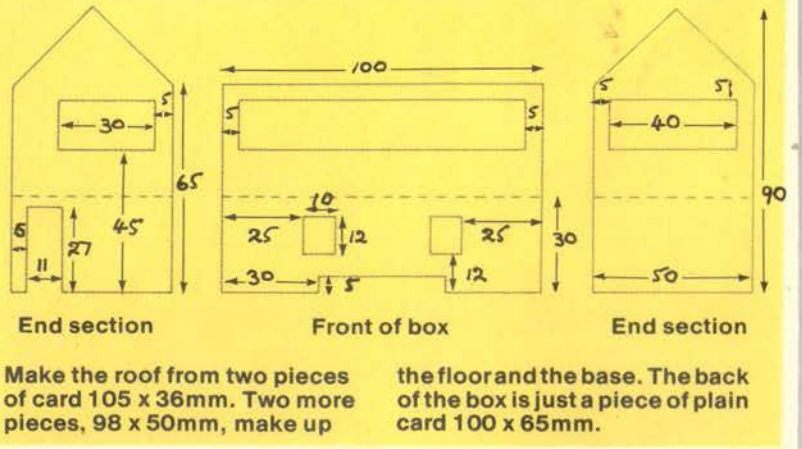
The diagram below shows the type with an **internal** staircase, as there is no point in making extra work for yourself.

Modelling a realistic outside stairway is a very difficult job — so it is lucky that not all signal boxes have one!

Adding the details
The main feature of a signal box is the size of its windows. The diagram shows a good way of applying the **glazing bars** — simply stick lengths of cotton over a piece of plastic.

As you can see inside the box, it is worth making two floors and adding a **lever frame.** Make it from a piece of rounded balsa and some headless pins.

Diagram of signal box

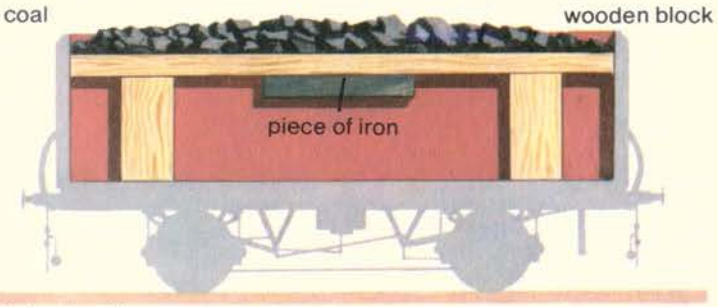


Make the roof from two pieces of card 105 x 36mm. Two more pieces, 98 x 50mm, make up the floor and the base. The back of the box is just a piece of plain card 100 x 65mm.

Wagon loads

Make your own wagons and flat trucks look more interesting by filling them with different loads.

The standard mineral wagon, which carries coal, limestone or iron ore, is best dealt with by making a false load (see below). Other types of load can be fully modelled. The pictures opposite will give you some ideas.



A false load in an open wagon

A false load looks just like the real thing. But in fact it is only a thin covering over the top of your wagon.

How to make one

Glue a thin sheet of card or balsa wood to two blocks of wood slightly smaller than the sides of your wagon, as in the picture above. The false load can then be glued on top.

Adding the load

Make your load from the plastic chips which you can buy in a model shop — or, better still, use real coal. One lump, crushed in an old piece of cloth, will provide enough coal for a whole train of wagons.

Fixing it to the card

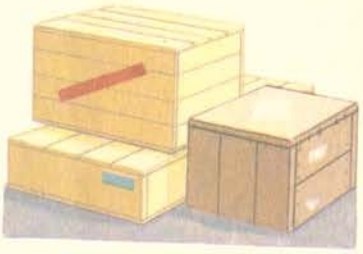
Spread your load over the top of the card then apply diluted white glue. Leave it to dry overnight. White glue dries transparent so you will not be able to see it. It will also soak right through the load, so the entire mass will be firmly fixed.

How to remove it

If you want your false load to be removable, you must stick a piece of iron under the load. A piece cut from a tin with an **old** pair of scissors will do.

The entire load can now be removed with a magnet. It is best to stick a small magnet square to a piece of wood about **10cm long.**

◄ **Oil drums** can be made from short pieces of round dowel, painted black or red oxide. **Barrels** are more difficult to shape. Do this with a knife before you cut them off.



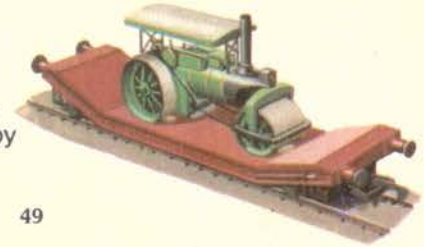
► **Crates** are just small pieces of wooden scraps with the planks drawn on the sides with a ballpoint pen.

◄ **Sacks** can be made from bits of modelling clay. Paint them light brown or grey when they are dry.

► Make **pipes** by cutting drinking straws into short equal lengths. Paint them black, grey or red oxide.

◄ Equal lengths of twigs make realistic-looking tree trunks for bolster wagons.

► Toy road rollers and bulldozers make striking loads for a Lomac or Well wagon. They can be bought quite cheaply in a model or toy shop.



The engine shed

The engine shed is rather like a narrow goods shed. This is one case where it is worthwhile making the extra effort to cut it out of plywood, but don't worry if you prefer to use card. A strongly built card model like the one opposite will stand up to a great deal of use.

All your buildings should be glued firmly to the layout. Use plenty of glue otherwise a gap will appear around the edge. Use flock powders, sand or ash to disguise the joins and make your buildings look part of the scenery.

How to make it

Once again, follow the dimensions given in the diagram below. Note that there must be plenty of **timber bracing** inside to stiffen the card. As well as the corner pieces, you should stick long stripwood pieces to the **top and bottom of the sides.**

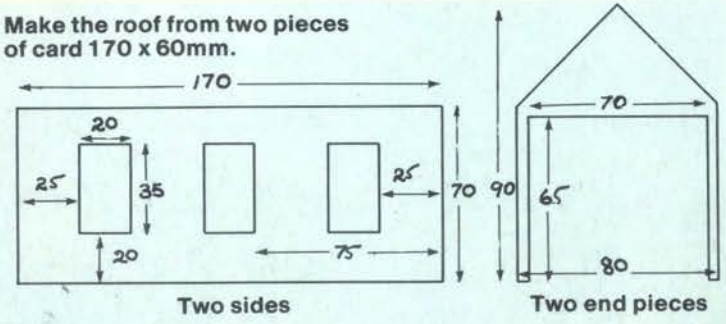
It is best to build the model as a through shed, since you are bound to rearrange your layout from time to time and may not always want to position your shed at the end of a siding.

The roof and doors

Engine sheds were originally built with doors. Over the years however, many of them fell off or were broken. Unfortunately they tend to fall off in model form even more easily than they did on the full sized sheds! So unless you want to model a historical layout, you can omit them altogether.

If you want to use your shed for steam locomotives you will have to add roof vents. To make a ridge platform, follow the instructions opposite.

Make the roof from two pieces of card 170 x 60mm.



Two sides

Two end pieces

The finished model

Steam locos needed coal and water — so these details must be added to your layout. It is best to buy the **water crane** as this is too difficult to model. Use card to make a platform with three sides. This makes a good **coal bunker.**

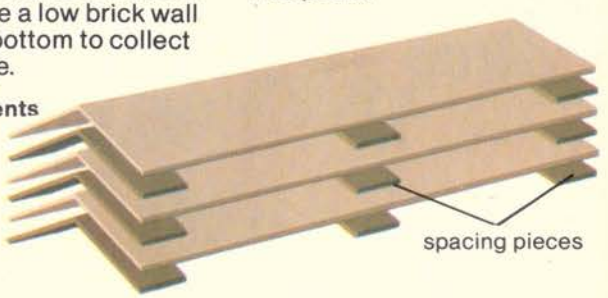
With diesels, all you need is an **oil tank**. Make one out of a piece of cardboard tube. It should have a low brick wall round the bottom to collect any spillage.

Roof vents

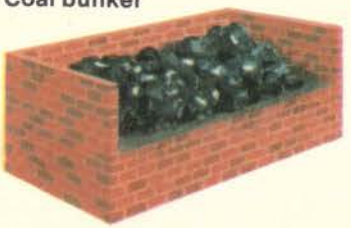
To make a louvered roof, you will need some strips of card **110 mm** x **25mm** long and some spacing pieces **25mm** x **10mm.**

Build up alternate layers of full length strips and spacing pieces over the top of the roof. Glue each layer firmly into place.

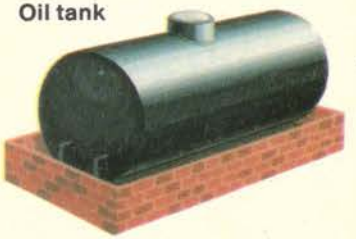
Roof vents



Coal bunker



Oil tank



Shops and houses

So far we have only shown you how to model railway buildings. But as you have probably realized, you can make shops and houses in exactly the same way.

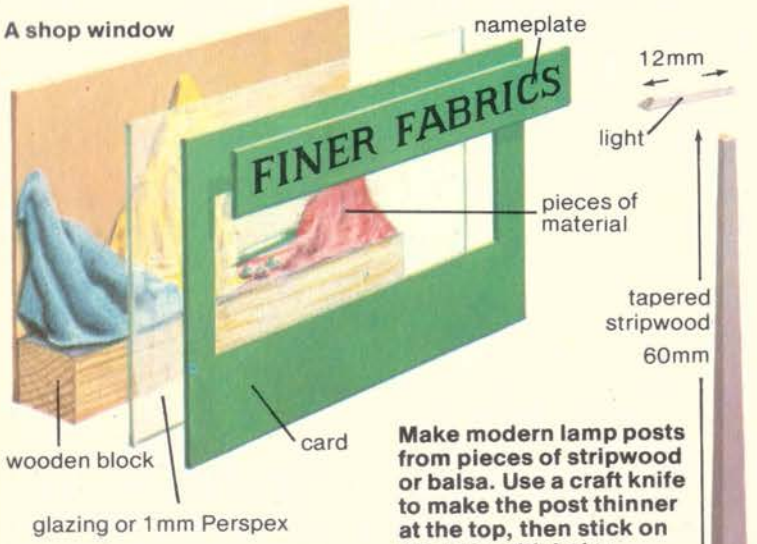
It helps to go out and look at the buildings where you live. Make notes on shapes and colours and compare the different heights of houses, street lamps and trees. If you make your models to the same proportions, your layout will look right.

How to make a shop window
Shops are great fun to model because you can add interior details that can be seen from the outside.

Make the window as illustrated below. You will need some **1 mm card**, a piece of **wooden scrap** and a sheet of **1 mm Perspex** or **glazing** that you can buy from a model shop.

Paint or ink in a suitable nameplate on a small strip of card, then glue everything firmly together.

A shop window



Make modern lamp posts from pieces of stripwood or balsa. Use a craft knife to make the post thinner at the top, then stick on the light with balsa cement. Paint it light grey.

Modelling shops and houses is not difficult — but you must remember to make everything to the same scale.

Modelling hints
Because of the limitations of space on a model railway, there is rarely room to model anything larger than ordinary houses and small shops.

The main thing to remember when modelling these is that all the doors and windows will be much the same size. Doors are just large enough to allow one adult to go through at a time and windows are normally arranged to allow the people inside to look out in comfort.

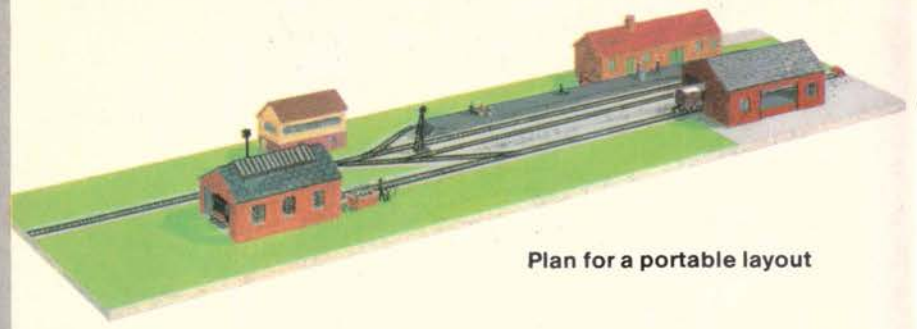
So always try to make your buildings fit your people and then they will look right.

Adding the details
Your model town will not look life-like without pavements, walls, fences and other such details. These can be cut from card and then painted.

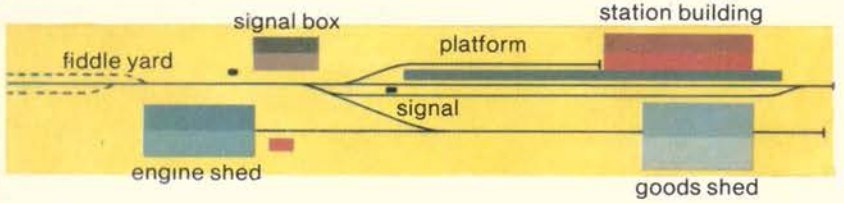
Add telegraph poles, cars, telephone boxes, and of course people. You will find a large selection of these ready-made items in your local model shop.

Finally, cut out lettering or small illustrations from comics or magazines and paste them to the walls of your buildings to represent advertising hoardings. Add other ideas of your own.

Putting it all together



Plan for a portable layout



A portable layout
You are now ready to put together all the things you have made and build a complete layout.

The design above is for a **branch terminus,** using only five points. Although it looks simple, it is actually capable of a great deal of complexity as you can use it to follow the full timetable of a real branch line.

The fiddle yard
Part of the secret is the addition of a **fiddle yard.** This is a piece of track that is meant to represent the rest of the railway system. Start with just a piece of plain track, but as you develop, add two or three sidings. Each can be used to store a complete train.

The station
As you can see, the station is made up of all the buildings you have made, together with a platform — and there is plenty of room to add extra details of your own.

This layout can be made on one or two baseboards, depending on how much room you have for storage.

Transporting your layout
It is worthwhile making the baseboards small enough to fit into the boot of a car. Then you can take your railway about with you and show it to friends and relatives.

Experienced model makers build portable layouts like this to take to model railway exhibitions.

A permanent layout
The design illustrated below is great fun to build — but be sure to ask for permission to use your bedroom in this way. The railway is carried above the furniture and has a lifting flap across the door. This is simple to construct, but make sure that the hinges are mounted above the level of the rails.

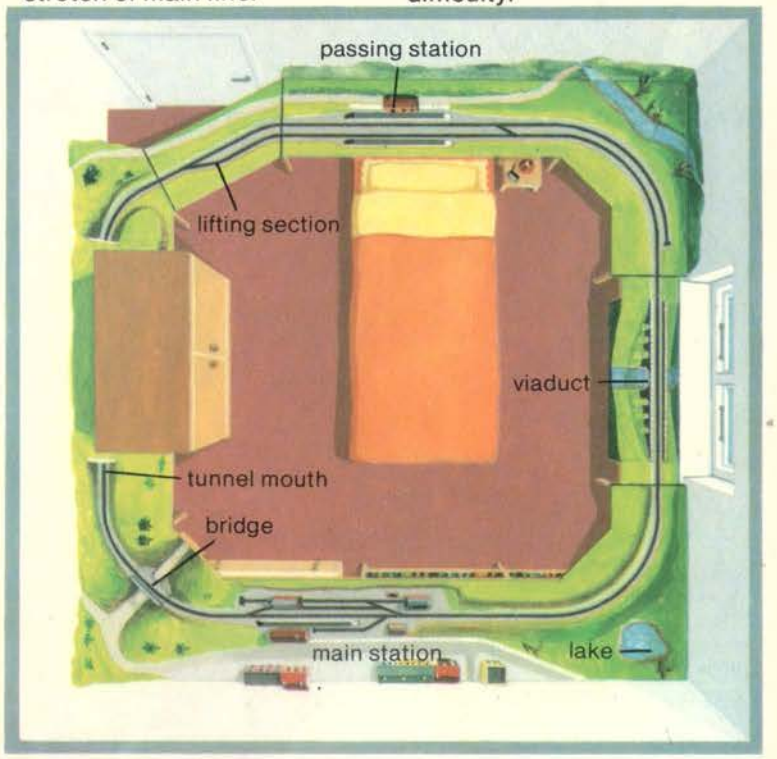
The wardrobe
Use a narrow board behind the wardrobe to carry your track and then make it into a tunnel. This will disguise the fact that your layout only runs in a circle round the room. You can imagine that it is really just the middle section of a long stretch of main line.

Adding buildings
The station from the first layout is used again here and there is a second passing station to make the operation more interesting.

However, to do this you will need a fairly large room. If your bedroom is small, you will only need one station.

A viaduct
A good place to build a viaduct is across the window. Make this section of your railway lift out.

It will then be easy to reach the window when it needs to be opened or cleaned and in this way the curtains can be drawn without difficulty.

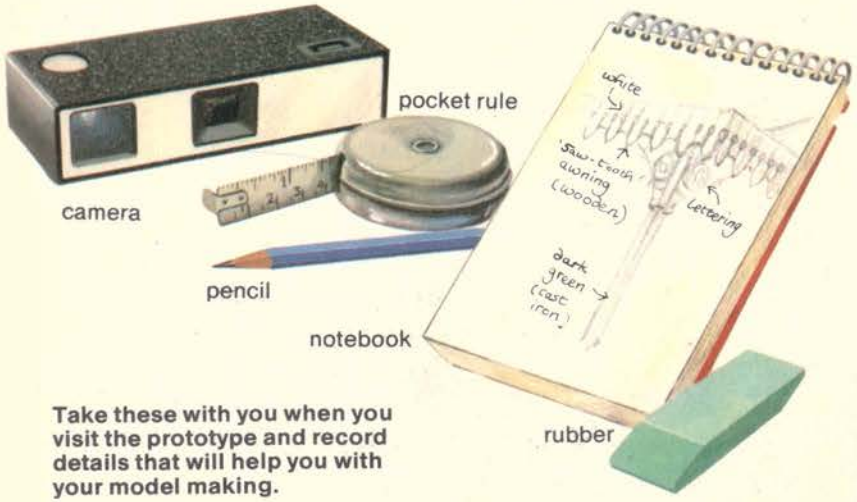


Studying the prototype

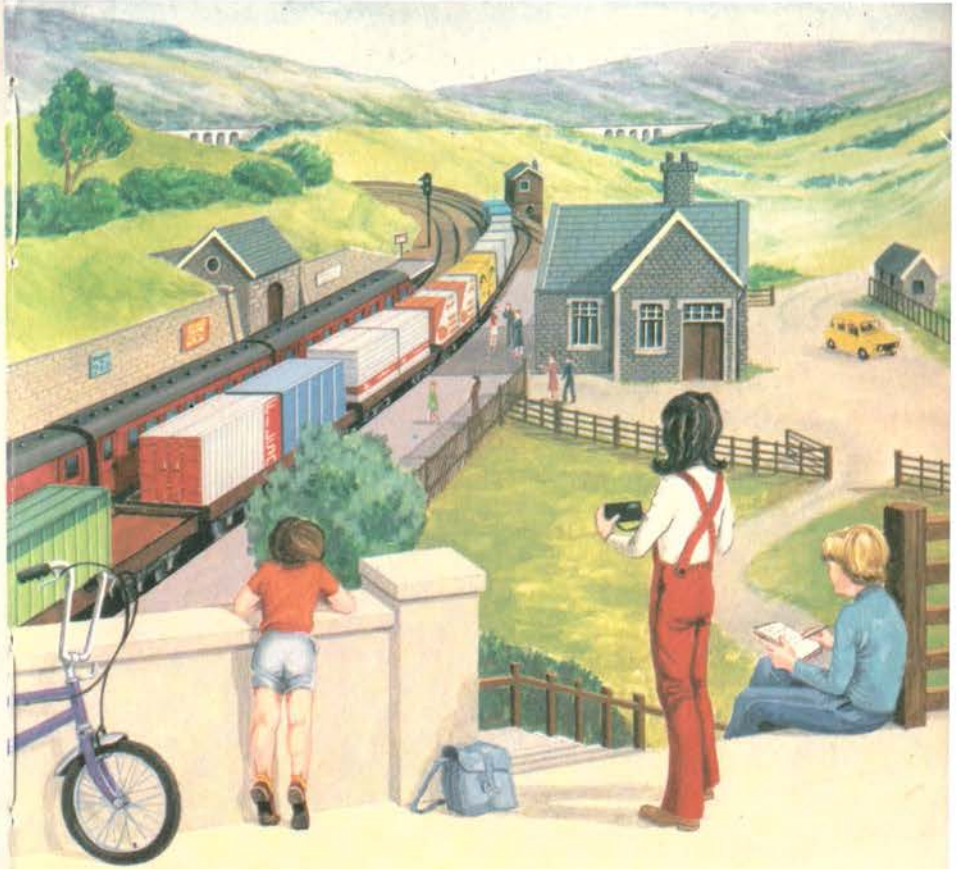
The best way to make your layout look realistic is to go out and look at the full-sized prototype. Take a notebook with you and make sketches of anything unusual. If you have a camera, take pictures of railway buildings and small details like lettering. It's worth remembering that colour slides are cheapest and are easiest to store. You can also enlarge them on a screen so that even the smallest detail becomes clear.

Don't take risks

Never trespass on railway property. It is not only illegal, it is very dangerous. But don't worry; you can see more things to model from the public side of the fence than you can hope to build inside five years. Finally, do try not to annoy passengers or railway staff. If you are polite and behave responsibly, they will be only too happy to answer your questions.



Take these with you when you visit the prototype and record details that will help you with your model making.



Studying the full-sized railway.

Modelling historical railways

Even though main line railways have now completely abandoned steam traction and many old stations have been rebuilt, you can still find evidence of the age of steam. But if you want to learn how to recognize this for yourself, you will have to study railway history.

There are plenty of books on this subject, many of them very well illustrated. Make use of your public library and try to join a model railway society. The more you find out about real railways, the more you will enjoy making your own models.

Reference section

Clubs and exhibitions

For the beginner, joining a model railway club is a very good way to find out more about the hobby. There are clubs in most areas, many of them affiliated to the **Model Railway Club** near Kings Cross Station in London. This has contacts with railway modellers all over the world.

Unfortunately, very few clubs cater for children under the age of about fourteen. But if you are interested, you can probably help adult modellers in some way — especially at exhibition time — and you will learn a great deal from looking at other people's layouts.

If you are lucky there will be a model railway society at your school. If not, why not start one yourself?

There are dozens of model railway exhibitions every year. One of the best is the **National Model Railway Exhibition** which is held at the Central Hall, Westminster.

Make a point of going to as many exhibitions as you can. There are demonstrations of fantastic working layouts and trade stands where you can see the latest developments in models and equipment.

Railway abbreviations

British Rail was formed in 1947. Before that, four companies dominated rail transport in Britain. These railways were always known by their initials:

GWR — Great Western Railway
LMSR — London, Midland and Scottish Railway
SR — Southern Railway
LNER — London and North Eastern Railway

Some of the smaller earlier companies were:

GER — Great Eastern Railway
CR — Caledonian Railway
GNR — Great Northern Railway
HR — Highland Railway
LBSCR — London, Brighton and South Coast Railway
LNWR — London and North Western Railway
MR — Midland Railway
SER — South Eastern Railway
NER — North Eastern Railway
GCR — Great Central Railway
NBR — North British Railway
LSWR — London and South Western Railway
TVR — Taff Vale Railway

Shops and suppliers

Most towns have at least one good model shop where you can buy equipment for your railway. Glue, paint and card can be bought from an artists suppliers like **Reeves and Sons Ltd.** or **Winsor and Newton.**

The list below is of some of the better known model shops. You can write to the head office address of **Beatties Ltd.** and ask them if they have a local branch in your area.

Beatties of London Ltd.
(Head office)
112 High Holborn,
London WC1.

Some of their local branches are:

210 Lewisham High Street, London SE13.

10 The Broadway, Southgate, London N14.

104-106 High Road, Wood Green, London N22.

7-11 High Street, Romford.

26 South Mall, Birmingham Shopping Centre.

17-18 Penn Street,
Bristol

30-32 Eden Street,
Kingston upon Thames.

36-37 Dawson Way, St. John's Centre, Liverpool.

16-18 King Charles Street, Leeds

14 Spring Gardens,
Manchester

43-47 Pilgrim Street,
Newcastle.

3 Mount Street,
Nottingham.

36 Pinstone Street,
Sheffield.

114 East Street,
Southampton

70 The Parade,
High Street, Watford

Other good model shops are:

Hadley Hobbies
131 Middlesex Street,
Bishopsgate, London E1

Scale Model Railways
87 Wellington Street,
Glasgow 2.

Howes of Oxford
9-10 Broad Street,
Oxford.

Kings Cross Model Railways
14 York Way, Kings Cross,
London N1.

Glossary

Abutment: the supporting structure on each side of an arch or bridge.

Alternating current (AC): electric current which flows alternately in each wire in a rapid sequence called a cycle. It is the normal mains electricity.

Ballast: the stone chippings that support the sleepers. They also hold them in place on the railway track and provide drainage.

Blade: the moving parts of a point which causes the wheels to go on one rail or another.

Bogie: a four or six wheel truck which is placed at either end of a coach or long freight wagon to enable it to go round curves.

Branch-line: a minor line which acts as a feeder to a main trunk line.

Catenary: overhead wires and their supports for carrying electricity.

Controller: an instrument which controls the speed and usually the direction of a model train.

Couplings: devices used to connect the locomotives, coaches and trucks together.

Cutting: a place where high ground has been cut away to provide a level path for the railway track.

Crossover: a crossing from one set of rails to another.

Direct current (DC): a current which flows in one direction continuously. Most model locos work on a direct current of 12 volts.

Embankment: an artificial mound used to carry track across a valley.

Fiddle yard: a set of sidings used on model layouts to store complete trains.

Fishplates: pieces of metal used to join rail lengths.

Flange: the projection on the outer part of a wheel which guides it along the rail.

Frog: the 'V' part of a point where the two inner rails cross.

Gauge: the distance between the inner faces of the rails on a length of track.

Halt: a stopping place without normal station facilities, for local train services.

Headshunt: a line parallel to the main line which is used for shunting.

Inspection car: a self-propelled service vehicle used for inspecting track.

Isolating section: a length of track which can be switched off while the rest of the railway is energized.

Louvres: slats of wood or metal with spaces in between to allow ventilation.

Marshalling yard: a large goods yard where wagons are sorted and made up into different trains.

Multiple track: a section of railway track having more than just one up-line and one down-line.

Pantograph: assembly on the roof of an electric loco, or unit to collect the current from an overhead wire.

Prototype: the full size loco, coach, wagon or railway from which a model is made.

Rolling stock: a general term used to describe railway vehicles, usually just wagons and coaches.

Scratch building: making a model from basic materials and components rather than from a kit.

Sleepers: wooden, steel or concrete beams on which the rails rest.

Tank: a locomotive which carries its water and fuel on its own frames.

Tender: a special truck coupled to steam locos for carrying water and fuel.

Terminus: the station at the end of any line of railway.

Tie bar: a strip which links the moving rails in a point to each other and to the operating mechanism.

Transformer: a device which converts one voltage of alternating current to another.

Turnout: another name for a point.

Underframe: the chassis of a coach or wagon.

Volt: an electrical measurement, meaning the pressure of the electricity in the supply.

Well wagon: a large wagon with a dropped central girder which is used for carrying large loads.

Booklist

If you have enjoyed this book, you will probably want to find out more about railway modelling and the history of full-size railways.

There are hundreds of books on railways.It is difficult to single out books from so many but some recent ones worth hunting for are:

The Illustrated History of Railways in Britain by G. Freeman Allen

British Rail 1948-78. A journey by design by Brian Haresnape

How about Railway Modelling by John Craven (EP Publishing)

The Encyclopedia of Model Railways edited by Terry Allen (Octopus)

The Hornby Book of Trains edited by S.W. Stevens-Stratten (Rovex Ltd.)

Pamphlets

The inexpensive Peco *'Shows You how'* series were all written by the author.

Although they are meant for adult modellers, you will find them very useful. Most good model shops will stock a selection of the following titles:

Wiring the layout
Building the baseboard
Planning the layout
Cab control
Low relief modelling
Point and signal control
Signalling the layout
Modelling the landscape
Turntables and traversers

Magazines

There are now four British magazines which are all published monthly. They are:

Model Railways
Model Railway Constructor
Railway Modeller
Model Trains

They are also written for adults, but many younger people enjoy them and reading the advertisements will help you to find out what kind of models and equipment you can buy.

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